Traditionally, producers faced a binary choice when channeling new technologies into consumers’ everyday lives. They pushed new science-based technology or adapted to often unimaginative market pull. The former isolated design from consumers, the latter from technology. The emerging information society aggravates the traditional trade-off into a dilemma. Many consumers fail to sufficiently comprehend new information technologies to meaningfully experience them, or to demand anything else from them. This article explores how Nokia, the world’s leading producer of mobile phones, channels new technologies into the everyday lives of consumers. Interaction with consumers is a driver of design at Nokia. Nokia mixes and matches diverse new technologies with consumer groups according to each group’s capacity to comprehend and experience these new technologies. We propose that Nokia’s heuristic rules about organization of interaction with consumers may generalize beyond Nokia.

INTRODUCTION

How ought producers to channel new technologies into the everyday lives of consumers to bring about the information society? Nokia, the world leader in “mobile” or cellular phones, appears to present an example worth following. Nokia successfully channels new technologies into superior design mobile phones, which permeates consumers’ everyday lives. With its large share of the rapidly expanding global mobile phone market, Nokia has growing experience of conducting a revolution in consumer lifestyles.

How does Nokia do it? How does it conduct its revolution in consumer lifestyles? In this article, the authors blend three literatures: forecasts of the emerging information society, product design and development, and the organization of experience. They document the Nokia experience to identify heuristic rules that form its principles in mobile phone design. They interpret them in terms of the literature to conclude how they extend beyond Nokia.

THE INFORMATION SOCIETY AND DESIGN AT NOKIA

New technologies diffuse science-based benefits of computers and telephony, which were earlier reserved for “high-tech” and large businesses, into small businesses and consumer households (Castells, 1996). In the emerging “information society” (Bell, 1999), consumers store, transmit and make extensive use of knowledge in a digital form. Whereas the infrastructure of the industrial society was “transportation” (railroads, highways etc) the infrastructure of the new information society is “communica-
tion”: cable, broadband, digital TV, optical fibre networks, combining data, text, voice, sound and image (Nokia, 2000a). These new technologies provide hope of overcoming scarcity. Unlike goods during the industrial age, “information” is not “used up” (Bell, 1999).

Applications of new technological possibilities in mobile phones, motion-based simulators and interactive games - to name just a few areas of application - encourage the creation of wholly new genres of experience. Based on their backgrounds and inclinations, some consumers have capacity to read, and comprehend new applications. They quickly develop an ongoing relationship with any new application and know how to use it. In order to further grow their personal capacity to experience and integrate ever new applications into their everyday lives (Pantzar, 1996), they create their own models about how to experience and interpret the applications (Pulkkinen, 1991). They are “co-producers” (Wikström, 1996) whose models attach new meanings to applications (Jensen, 1996).

Consumers differ in how they are attentive to new applications and technologies (Ackrich, 1992, 1995; Woolgar, 1996; Castells, 1996; Goffman, 1974). Most consumers have limited capacity to comprehend new technologies when they first encounter them. They have little with which to build the initial link between their needs or waits and the technology’s potential (Gerschuny, 1992; Rosenberg, 1994; Pantzar, 1996, 2000). They look into the past for established models of use for guidance on how to experience and interpret new applications (Brown and Duguid. 2000).

Thus the models that the co-productive consumers create become the seed of future standards for industry (David, 1985). Most consumers treat technologies as unreliable and unnecessary extras. Or they only use them for entertainment. The more there are consumers of these two latter kinds, the more society strays away from the other kinds of ideal technologies in the information society: infotainment and transactions (Nokia, 2000b).

DESIGN AND THE ORGANIZATION OF CONSUMER EXPERIENCES

Traditional design for industry transformed consumers' everyday lives in one of two ways: “technology-push” or “market-pull” (Nokia, 2000b). In technology-push, producers took a given technology or a well-specified technological sub-system, applying it into consumers' everyday lives as true to the original as possible. In market-pull, producers took consumer demand as their point of origin, channelling only those new technologies that consumers demanded (Ulrich and Eppinger, 1995). The traditional trade-off was that technology-push isolated design from consumers and market-pull isolated it from technology.

The traditional trade-off has not disappeared. In fact, the emerging information society aggravates the trade-off into a real dilemma. Many consumers lack the capacity to comprehend new information technologies to use them or to pose demands on them (Brown and Duguid, 2000). The basic ideal behind the information society is that consumers and the society as a whole make a “transformation” towards rich and meaningful use information in an enlightened way, rather than become passive non-consumers or degenerate into players in an empty-headed amusement park in the model of Las Vegas (Pine and Gilmore, 1998).

Producers must interact with consumers to determine how they comprehend new technologies (Brown and Duguid, 2000; Bell, 1999; Pine and Gilmore, 1998; Castells, 1996; Goffman, 1974). Given differences in the capacity of most consumers to comprehend new technologies the process of channeling new technologies must be
a three-way relationship between the producer, consumers that actively shape demand with their responses, and consumers who bring in the sales volume. The producer can openly collaborate or experiment with what we have earlier called co-productive consumers. Even when there is no pre-determined script for interaction, these consumers comprehend complicated stories, persist with the use of new applications despite initial difficulties, and provide a model for others of how to incorporate new technologies into everyday life. These consumers possess high initial levels of capacity to “read” and interpret new technologies. They have intimate knowledge of a multitude of earlier models or scripts from their use of older technologies. They improvise with these old models to experiment with a new technology, mixing and matching to come up with their critical interpretations and to possess their unique versions of the application. Interaction stimulates the active consumers’ open responses and grows their capacity to “read” and interpret new technologies to ever-higher levels.

Other consumers lack intimate knowledge of new technologies. In contrast to the co-productive consumers, they provide the producer with tightly configured “stage”, script and audience. (Pine and Gilmore. 1998). These consumers preferred a no-nonsense performance with fixed script, clear choices of the central actors, and narrow range of meanings that can be deciphered from the performance of each given new technology.

Literature suggests that the design of new “cellular” or mobile phones necessarily takes place between producers and consumers, instead of information reaching the consumer or producer in a linear chain (Ulrich and Eppinger, 1995).

HOW NOKIA’S DESIGN FOR THE INFORMATION SOCIETY WAS STUDIED

Mobile phones are an essential part of the information society (Bell, 1999). Mobile phones are terminal devices that extend the functions and other benefits of cellular telecommunications systems for consumers and other users, such as businesses. Thanks to earlier studies spanning research methods such as participant observation in research projects (Panzar, 2000), interviews (Panzar, 2000; Pulkkinen, 1997), historical research (Panzar, 2000; Pulkkinen, 1997; Ainamo, 1997; Lovio, 1993) and comparative research (Sakakibara et al, 1995; Ainamo and Lindholm, 1996), we have a sizeable knowledge base consisting of a considerable range of earlier research concerning the ongoing history of Nokia’s design and mobile technologies and markets. The knowledge base includes data about mobile phones, smart phones and communicators; information about Nokia’s earlier and ongoing experience; and knowledge about the intensifying and changing interaction between Nokia’s designers, managers and other personnel, as well as between lead users and subsequent followers of its phones.

The authors analysed the knowledge base to understand how Nokia balances the requirements of its design for the information society. The knowledge base alone enabled the authors to draw many interesting perhaps and potentially useful propositions about design for the emerging information society. In addition, the authors maintained social networks both with designers in the Nokia organization and with other insiders in the industry, who live five years ahead of the technological potential and the market’, as one of the Nokia designers remarked. The authors tried out Nokia’s products in order to understand them and to check that they had correctly grasped their intended use (Dahlbom and Mathiassen, 1993). They constantly followed coverage in journals, in newspapers, and on the Internet. They limited the number of propo-
sitions to meaningfully present in this article through question and answer sessions with seven representatives of Nokia’s organization whom they carefully selected to represent design, research and top management.

The authors’ interpretations of Nokia’s design for the information society remains their own rather than those of Nokia. They present their interpretations in the form of a narrative. This narrative should not to be considered scientific in relation to absolute tests of reliability of the data or their analysis. Rather, it makes a contribution by importing internationally rather poorly known knowledge of the Nokia experience into the international arena. Designers at other producers and across technologies benefit from good examples of how to reconcile their dynamic practical purposes with accepted theories; to discover and interpret new facts that revise accepted theories; to distinguish design knowledge from design ignorance, as well as edit-out misunderstanding and outdated knowledge. The Nokia experience is not without potential in being such an example.

THE THREE GENERATIONS OF MOBILE TELEPHONY AT NOKIA

Mobile telephony is in some ways a legacy of the land-line telephony invented by Alexander Graham Bell in 1876. However, a key difference is that land-line telephony has an extended history, while the history of mobile telephony is short. Successful land-line producers have industrial cultures or “administrative heritages” (Bartlett and Ghoshal, 1989) whereby they repeat tacit routines originally created for dealing with the local legacies and traditions of each country where they have a land-line network. In contrast, mobile telephony requires explicit and global technological platforms that must work across local routines. Users of mobile phones “roam” from one region to another.

Generally, interacting with a local heritage that differs from that of global competitors differentiates a producer from those competitors (Djelic and Ainamo, 1999). Most mobile phone producers operate also in land-line technologies. Nokia is an exception. It was only in 1960 that the producer began to develop its competence with the closed cellular networks of the Finnish public sector (Lovio 1993; Pulkkinen, 1997; Ainamo, 1997). Nokia’s late start in telephony and its lack of a binding legacy in land-line technologies form the embryo from which its global leadership in mobile phones has developed.

FIRST GENERATION MOBILE PHONES: HIGH TECH VISIONS

When the technological possibilities for mobile telephony began to seminally emerge in the 1970s, the Nordic governments shifted their policy from closed network access (police, military) to open network access, and from universal to differentiated public service. The Swedish, Finnish and Norwegian states each owned a national telecom monopoly The governments and their monopolies invited key private sector actors - the Swedish Ericsson and the Finnish Nokia to work together to create a platform based on analogue technology. Later, this platform became called the “Nordic Mobile Telephone system” or NMT. The national monopolies created the infrastructure, while the private sector producers supplied the necessary hardware. The former worked from the top down and the latter from the bottom up. These roles prevailed until the mid-1980s, when Nordic deregulation in telephony began.

Among the private sector producers, Ericsson had a long tradition in land-line telephony. Ericsson retained its business focus in new land-line switching technology,
taking a conservative, even if positive, view of mobile telephony technologies. Nokia, in contrast, was unconstrained by strong traditions in telephony. It made big bets on the shape of future technologies: its research and development expenditures remained well below 10 per cent of its net sales - a small percentage, given the development of what at that time was considered extremely high technology (Lovio, 1993). Besides mobile telephony, it was also active in such new fields as computers and consumer electronics.

When Nokia started in telephony, there were no courses on product architecture in the education of engineers. Thus Nokia had its first phone designed by an independent Finnish industrial designer. The designer was given the stack of components that were the essence of the technology and a brief asking him to devise a product concept by creating physical linkages between them. He was granted little discretion as to the engineering or marketing of the product. His brief was very simple: to use his wide experience of product architectures in diverse industries to come up with a satisfactory, simple configuration of hardware components so that the project could proceed (Pulkkinen, 1997).

The NMT network and Nokia’s and Ericsson’s phone handsets were major technological breakthroughs when they were introduced in 1981. The phones were almost prohibitively expensive and thus became a means of gaining distinction: if somebody had a mobile telephone, he or she had to be very important indeed. The diffusion of the handsets was very slow. Top managers in Finland, Sweden and Norway became the lead users.

Towards the end of the decade, the market began to show signs of growth. “Dragability” gave way to a new and exciting vision. Calculations indicated that handsets would become smaller, cheaper and better. More and more business people would take up the use of mobile phones. There would be true mobility, efficiency and reliability. The growing customer base and sales volume would mean that the share of fixed costs of the total manufacturing costs could be distributed over more products and customers. Mobile phones would diffuse into consumer households and become less of a status symbol.

Besides its vision of changing mobile phone use, Nokia also had a vision about technological trends: mobile phones would converge with computers and with audio-visual media such as television. Nokia already had a well-developed computer business. In the mid-1980s, it acquired an additional string of television factories to enlarge its television business.

While the vision about use was a road to success, the vision about technological convergence posed a threat to that success. The enlargement of the television business proved a drastic failure for Nokia well before the 1980s ended. The losses put Nokia in double jeopardy. Nokia had planned to finance the increasing research and development costs in mobile phones with profits from televisions. Now it had both used all excess funds in a foolhardy venture and lacked future cash flow. The obvious thing to do was to increase liquidity: Nokia sold off its computer and television businesses, both at a loss.

SECOND GENERATION MOBILE PHONES: COLOUR AND FASHION

After selling its television and computer businesses, Nokia entered the 1990s as the most focused of the three main competitors in mobile telephony (Nokia, Ericsson, and the American Motorola) in a way that was unplanned. Despite the rather spurious
scheme by which its business focus was determined, Nokia ended with a great competitive advantage.

It was precisely at this point that industry experts reached accord that analogue technologies and standards such as NMT, originally developed for military and more recently for business purposes, would now find their way into households. In the late 1980s, the NMT standard had diffused in the Nordic countries to the extent that service capacity was becoming too limited. The network was already overcrowded with traffic. Internationally also other countries were expected to evolve according to a model of diffusion reminiscent of personal computers. The business sector would insist on having the most powerful technology, while consumer households would opt for affordable price.

Within this context, the strategy of Nokia was to take risks on the shape of future technology. The emerging second wave of the information age was to be digital. This second or digital wave would take over from the first or analogue wave (telephones, radio and television). Digital technology gave more capacity than analogue. It was based on binary code. This would make the second generation an explicitly standardized platform, in contrast to the NTM.

Many of the interfaces between the different layers and steps of the value chain could be standardized and outsourced to partners. Nokia's risk-taking paid off when the trend in mobile telephony shifted from the first generation NMT (analogue, 450 and 900 kHz) to the second generation (digital, in the 900, 1800 and 1900 kHz ranges) with the Global System for Mobile Telephones, or GSM.

Despite its military prowess (or because of it), US transition from analogue to digital mobile telephones was slower than in the Nordic countries. Even as late as 1998, only one US operator (ATetT) was capable of offering nationwide service in first generation mobile telephony. The country had difficulties in developing a common standard. Motorola's strategy of focusing on phones for the various analogue standards in the US proved a great success for a while, reaching its peak in 1994. From then onwards, it led to decline. Motorola fell far behind Nokia and Ericsson.

The world's first digital network opened in Finland in 1991. Nokia’s now classic 2110 GSM phone proved a phenomenal success. Global industry experts identified Nokia as the world's number one. They said global evolution would follow the example of Finland and Sweden where the GSM platform of the second-generation mobile telephony had quickly reached sufficient critical market mass in the business sector to soon spread into households.

Nokia’s designers gained a critical lead over Ericsson by introducing colour, styling and fashion in its handsets. The 2110 phone enabled consumers to “customize” their mobile phones with accessories, such as removable and exchangeable colour “skins”. Nokia’s interaction with consumers created products that better met the needs of producers and diverse consumers alike.

Nokia created critical mass and social infrastructure even before consumers saw the first generation mobile phone as directly useful, fun or meaningful. Nokia’s phones began to appear in newspapers and magazines, as well as on TV; in a new light. The media coverage reified its phones as cultural artefacts. The aura of culture added an extra dimension of depth into the interaction of Nokia’s product design with its customer base.

In 1995, the penetration of first generation analogue and second-generation digital phones in Finland grew to 15 per cent of the country's population. Instead of a slowdown, penetration accelerated. Lead GSM users in the Nordic countries soon had several terminals: one for voice services, another for data transmission.
Like the first-generation analogue system, the second-generation digital system began to approach the limits of its market expansion. New subscribers swarmed into the networks. By 1998, the Finnish Nokia was the global leader in second-generation GSM phones; net sales grew and profitability improved. Much of Nokia’s success was due to the large demand for phones in Finland, where the penetration rate was 38 per cent in December 1997 and climbed to 60 per cent by December 1998. In such other countries as Italy, Portugal and the UK, first and second generation mobile telephone became fashionable in December 1998, with penetration exceeding 20 per cent and accelerating, just as in Finland a year before.

THIRD GENERATION MOBILE PHONES: SENSITIVITY TO KNOWN AND UNKNOWN LIFESTYLES

In the mid-1990s, designers were uncertain about whether future phone input would be based on a pen, a keyboard or voice; about whether designer of product concepts, or component suppliers, assemblers or retailers would beking (Sakakibara et al, 1995); about design choices between size and batteries, between display and memory, as well as about the number, size and cost of product features (Ainamo and Lindholm, 19–6). Microsoft was intent on driving home its idea that only its CE software platform—a compact Windows—would ensure compatibility With desktops.

Rapid technological evolution followed. It was becoming clear that, like personal computers, mobile telephony would call for global, mutually compatible standards for mobile phones, smart phones (voice, email) and communicators (phone plus computing and multimedia). The limits as to the capacity of the second generation digital system to integrate new services became evident. In 1996, Nokia launched its Communicator 9000’ (an integrated second generation digital phone, email, web, fax, diary, address book, notepad, and short-message terminal) on a Geoworks operating-system platform. Many saw the Nokia communicator as a big bet on how computing, the web and mobile telephony would converge. This “great leap” forward attracted full market attention. In reality, it was a purposeful compromise or hybrid, a GSM with limited computing functions (Ainamo and Pulkkinen, 1997). Together with the Japanese NTT DoMoCo and Ericsson, Nokia simply began to prepare for the Japanese third generation (3G) network, set to open in Japan in 2001. A similar Universal Mobile Telephone System (UMTS) was set to open in Finland in 2002.

In 1997, Nokia, Ericsson and Motorola coalesced to support an operating-system platform called EPOC, which was developed at a producer called Symbian. This was partial positioning against Microsoft’s CE platform, but not only that. Nokia’s third generation phones would support both the EPOC and other ways to access the web- Nokia thus enlarged the variety of design within its organization, as opposed to its earlier stance of risk-taking in previous product generations. For example, in 1999 Nokia launched the 7710 smart phone’ which supports the Wireless Application Protocol (WAP). WAP is essentially an Internet protocol for mobile hand-held devices. But Nokia did not adopt WAP access in all of its new phones.

Nokia follows more than one version of the emerging information society by accumulating experience both about new unholding lifestyles. It has “customized” several alternative kinds of third generation phone hand-sets to appeal to different kinds of consumer lifestyles. Some of these phones have been but visions: e.g. digital phone for voice, communicator for data, smart phone for car and camping. Similarity, some of the lifestyles are based on the vision that total market penetration will eventually go beyond 100 per cent – perhaps a likely scenario, but not yet reality.
The Nokia way of dealing with new technologies and unfolding consumer lifestyles is increasingly based on designers tacitly having internalized the new norm of interaction, rather than artistry or direct supervision, direct control or directly measurable results (Nuovo, 2000). Nokia encourages its designers to propose new concepts that comply with the interaction orientation and to keep proposing them again and again until the concepts are dealt with adequately in one or the other of the producer’s divisions.

Nokia has right from the start succeeded in engaging designers who manage to define new product architectures. It is not long ago that the producer employed the first designers who managed to insert new meanings into products and thus appealed to users. Increasingly, Nokia employs designers who can comply with two contradictory demands: architectural austerity and frivolous fashion.

Nokia is now a big and successful producer working with many new technologies. Having collected, analysed and interpreted consumer experiences with new technologies, third generation mobile technologies, and the unfolding consumption patterns in the emerging information society, Nokia envisions that computing, telephony and the worldwide web will converge on a generic level. It bets less big than it did with the first and second generations, and allows individual phones, such as communicators and smart phones, to diverge. Even years ago Nokia concluded that several kinds of third generation phones would enter consumer lifestyles.

Today Nokia wins the hearts of consumers by “medializing” (Salovaara, 2000) its products. Nokia's design statement, including head designer Frank Nuovo's interviews and the producer’s creative ways of launching new products, is a pioneer in electronic industry.

For example, Nokia launched its Nokia 8210 during the Paris fashion week at the thirtieth anniversary celebration of Kenzo design: 'Nokia enters the Kenzo world of fashion...Nokia as the world’s leading design house for mobile communication. (Nokia, 2000b) A vivid presentation of the products and services in the media helps to guide consumer preferences in the desired direction.

During the early 1990s Nokia had already organized the development of its most radically new technologies and concepts on the basis of ad hoc teams. This organizational solution diffused also into less radical technologies and concepts in the late 1990s. In 1998, Nokia established a totally new division called New Ventures. The design of those new technologies, which were most revolutionary at the time, was located within this division. Digital home platforms based on IP technologies, WAP-related products, visually rich display devices, and new start-up businesses and technologies were not yet in the natural scope of Nokia's old divisions.

DISCUSSION

In the creation of its technology-based first generation mobile phone systems, Nokia asked its product designer to translate high technology into an interface sufficiently compatible for high technology dilettantes such as top managers. He was provided little discretion as to engineering or marketing of the product. The brief was to complete work on the NMT system by devising a whole out of existing hardware components and requirements of the NMT platform.

Both usage of the phones and the design of new generations of phones were at first expensive. Most use was bound to be business use. Research, design and development costs were high when Nokia developed its second generation mobile
telephones. Production prices came down. Across countries, second generation mobile phones attracted both business customers and consumer households.

Nokia bet big. It envisioned usage to spread into consumers’ everyday lives. While other key players focused on technological convergence, Nokia gained a critical lead by introducing colour, styling and fashion into its phones. Consumer use and sales increased. Soon, market-pull both enabled and required Nokia to take many features of mobile phones as ‘givens’. Market demand began to determine the actions of Nokia, instead of vice versa. Nokia curbed the artistry of its designers. It still encouraged them to excel.

Technologies behind third generation mobile phones number more than ever. There are more layers of the technological platform than ever. The multiple layers and standardization of these technologies have increased the need for, and the practice of, codification and standardization. With standardization, consumers have been able to treat the new technologies as black boxes. This has addressed the problem of the capacity of consumers to comprehend the new technologies.

Exploiting the possibilities of the new technologies, Nokia has launched a diverse range of mobile phones that has excited some consumers but challenged others. Nokia interacts with consumers to trigger market-pull for third generation phones. Nokia provides special ad hoc teams of designers to interact with innovative consumers and other customers and users worldwide. These teams use radical new design methods. Rather than stopping analysis at the level of sales statistics, Nokia uses “contextual design”; that is, its design, teams place consumers in specially constructed laboratory settings or artificial contexts. There consumers experiment with new product concepts; designers engage in friction-free user-producer interaction with end-users to collect, analyse and interpret their experiences and stories they tell about product use.

Like musicians in a jazz quartet, Nokia’s management lets these special teams improvise within given limits. These limits include Nokia trying to fund these teams, at least in part with direct sales revenue. This contact with the market mechanism promotes a culture that encourages the teams to stay sensitive to consumer feedback in a way reminiscent of the Japanese (‘learning by trying’, in Sakakibara et al. 1995).

In many of its first and second generation phones, Nokia limits its product designers possibilities to change concepts or to lead product development. Nokia expects its designers to comply with the “irreversibilities” of earlier design choices, technological progress and maturing consumption patterns. In this respect, Nokia follows the American tradition of cross-subsidization: mature technologies are cash cows that fund the design of new product generations.

Nokia’s sales grow with consumers’ growing comprehension of new technologies and. Thus, with the emerging information society. To conduct the multitude of technological and market contexts with innovative and flexible design principles, organizing interaction at Nokia is increasingly important. Organization design at Nokia takes precedence over product design isolated from technology or consumers, as well as over interaction as an end in itself. A well-oiled and flexible organization delivers good products in the long run while sustaining access to user feedback.

Nokia offers its business customers and individual consumers a diversity of concepts: old generations of phones, as well as communicators and smart phones. There are differences across countries. Nokia “black-boxes” or standardizes what is old and everyday, to grow the clientele and volume of these applications resulting in economies of scale and growing profits. At the same time, it frames applications of new possibilities as “exciting”. Nokia frames each application so that the target seg-
ment of consumers comprehends it to the degree necessary. Older generations remain in the portfolio only as long as they have a cost or value advantage to consumers or other users. Nokia exploits old applications to move faster and more flexibly into exploration of new exciting technological possibilities and their applications.

CONCLUSION

The traditional view of product design and development was that design is a linear process of technology-push or market-pull. According to forecasts of the emerging information society, technology-push and market-pull are less and less mutually contradictory in channelling new technologies into consumers’ everyday lives. Organization of experience literature suggests that organizations and societies seldom make simple transitions to a given end state. Generally, consumers may use new technologies in more than one way. When their ways of use diverge rather than converge they feed back into the process of change, nourishing open-ended continuation of the process. “Correct use” is fixed only when consumers’ ways of use converge into a single way of use.

In principle, consumers willingly use technologies in convergent ways to experience balance and meaning in their everyday lives. However, when they lack sufficient capacity to comprehend new technologies; they do not use them, or use them in hugely divergent ways.

In channelling new technologies to consumers, a producer’s sensitivity to differences in consumers’ capacity to comprehend new technologies matters. Grouping consumers according to differences in their capacity to comprehend and experience new technologies serves several purposes. The producer learns to organize its interaction more effectively. Consumers grow their capacity to comprehend and experience new technologies. The capacity of consumers to comprehend and experience new technologies links directly to the emergence of the information society.

No prior study, to the authors’ knowledge, has linked the literatures of the information society, product design and development, and organization of experience as the authors have. The data on which they based their link may as yet appear scant or of unequal quality. The authors may not yet fully grasp the dynamic web of technologies, interaction and evolution associated with design for the information society. Most measurements in basic or applied science, such as market studies and tests, which strive to be as objective as possible, may not hold. However, what the authors call the Nokia experience ought to still be a meaningful frame or model for designers, users, managers, and researchers.

This article has established interaction as a basic way to channel new technologies into use. Interaction, as a topic in itself, still calls for a more fully developed chain of evidence and theoretical elaboration. The authors have also provided light on ways in which a producer can organize its interaction with consumers or other users.

The classification and treating of the resulting range of user experience remains a topic for further research. The authors invite others to work with us to fill research gaps at the cross-section of social forecasting, product design, and the organization of experience.

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